

REMARKS

In response to the Office Action dated March 22, 2001, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims.

Claim 8 was rejected under the first paragraph of 35 U.S.C. §112, as not being supported by the specification. The rejection states that claim 8 "discloses a truncated spherical body having a base, and a plurality of surfaces tapering from the base toward an apex, wherein the tapering surfaces geometrically proportion the body with the center of gravity below the center of bouyant support and toward the apex . . ." This recitation does not correspond with the copy of claim 8 appearing in the file of Applicants' undersigned representative. According to Applicants' record, claim 8 depends from claim 7, and recites that the second (convex) surface is aspherical. This subject matter is supported, for example, by the 6th embodiment of the invention illustrated in Figure 11 and described on page 4, lines 25-27.

A copy of page 14 from Applicants' file, which contains claim 8, is attached. If the Examiner's file contains a different version of claim 8, as reflected in the rejection, he is respectfully requested to contact Applicants' undersigned representative, so that any discrepancy between the two files can be identified and corrected.

Claims 1-4, 7, 9-16 and 18-24 were rejected under 35 U.S.C. §103, as being unpatentable over the Medina Puerto et al patent. With reference to claims 1 and 15, the Office Action states that the Medina Puerto patent discloses a first convex surface, with reference to Figure 3, surface 6.2, and a second convex surface (Figure 3, element 3). It is respectfully submitted, however, that the Medina Puerto patent does not disclose the subject

matter of claims 1 and 15. More particularly, claim 1 recites a lens element having a first surface convex to the long conjugate distance side, wherein luminous flux passes through a peripheral part of said first surface. The lens illustrated in Figure 3 of the Medina Puerta patent is comprised of two surfaces on its long conjugate distance side, namely an inner convex surface 4.2 and an outer, annular surface 6.2. The inner, convex surface 4.2 forms a mirror, whereas the outer, annular surface 6.2 admits light into the body of the lens. As clearly illustrated in Figure 3, the outer, annular surface 6.2 is a *planar* surface.

Claim 1 recites that the first surface at the long conjugate distance side is a *convex* surface through which luminous flux passes at a peripheral part of this surface. In the arrangement shown in Figure 3 of the Media Puerta patent, luminous flux does not pass through the convex surface 4.2, since it is a mirror. Rather, the luminous flux only passes through a *separate*, planar surface 6.2. Accordingly, it is respectfully submitted that the Medina Puerta patent does not disclose the subject matter of claim 1, nor its dependent claims 2-4.

For similar reasons, it is respectfully submitted that the Media Puerta patent does not disclose the subject matter of claim 15. This subject matter has now been incorporated into claim 13, which recites a lens element having a first convex surface on the long conjugate distance side thereof with a reflective coating on a central portion thereof and a light emitting area on the convex surface at the periphery of the reflective coating. In contrast, the Medina Puerta patent only discloses that the convex surface 4.2 is a secondary mirror. It does not disclose that this surface has a light emitting area at the periphery thereof. Rather, as discussed previously, the light emitting portion of the lens is formed by

a separate, planar surface 6.2. Accordingly, it is respectfully submitted that the Medina Puerta patent does not disclose the subject matter of claim 13, nor its dependent claims 14 and 24.

The rejection of claim 9 refers to the embodiment shown in Figure 2 of the Media Puerta patent. With reference to this embodiment, the rejection states that the patent discloses a first convex surface 6.1 to the long conjugate distance side and a second convex surface 3. Claim 9 recites a lens element having a first surface concave to the long conjugate distance side, wherein luminous flux passes through a peripheral part of said first surface. While the embodiment of Figure 2 in the Media Puerta patent contains a concave surface 4.1, there is no disclosure that luminous flux passes through a peripheral part of this surface. Rather, the patent only discloses that this is a specular surface, i.e. light reflecting. Similar to the embodiment of Figure 3, light passes through a separate, planar surface 6.1 which surrounds the inner convex surface 4.1. Accordingly, for reasons analogous to those presented previously, it is respectfully submitted that the Medina Puerta patent does not disclose the subject matter of claim 9, nor its dependent claims 10-12.

For similar reasons, it is respectfully submitted that the patent does not disclose the subject matter of claim 20, which has been rewritten in independent form as new claim 25. This claim recites a lens element having a first concave surface on the long conjugate distance side thereof with a reflective coating on a central portion and a light emitting area on the concave surface at the periphery of the reflective coating. There is no disclosure in the Media Puerta patent that the concave surface 4.1 has a light emitting area at its periphery. Rather, the admission of light takes place through a separate, planar surface

6.1. Accordingly, it is respectfully submitted that claim 25, and its dependent claims 21-23 and 26, are allowable over the Media Puerta patent.

It is noted that the penultimate paragraph of the Office Action states that allowable subject matter has been indicated. It appears that the inclusion of this paragraph in the Office Action was inadvertent, since all claims (other than claim 8) have been rejected on the basis of prior art. If, in fact, the Examiner intended to indicate that some of the originally filed claims contain allowable subject matter, he is respectfully requested to identify those claims so that Applicants can take appropriate action relative thereto.


The amendments being made to claims 1 and 9 herein are not being presented for purposes of patentability. Rather, they are intended to broaden the scope of protection to which Applicants believe they are entitled. Specifically, the practical applications of the invention are not limited to microoptical systems. Rather, the claimed lens system is also effective in more conventional optical systems, and therefor the preambles of these claims have been amended to encompass this range of applications. Furthermore, it is not necessary that the reflected image appear in the vicinity of the vertex of the second surface. Rather, the focusing point for the image can be outside of the lens element, along its optical axis. Accordingly, claims 1 and 9 have been amended to reflect this aspect of the invention as well.

Favorable consideration of the claims is respectfully requested.

Respectfully submitted,

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Attachment to Amendment dated July 23, 2001

Marked-up Claims 1-4, 9-14, 21-24

1. (Amended) [A reflecting microoptical] An optical system comprising,
a lens element for focusing incident luminous flux at a predetermined
position, said lens element having, from a long conjugate distance side, a first surface
convex to the long conjugate distance side and a second surface convex to a side opposite to
the long conjugate distance side,

wherein the luminous flux passing through a peripheral part of said first
surface is reflected at a peripheral part of said second surface, is again reflected at a central
part of said first surface and [is imaged in the vicinity of a vertex of said second surface]
imaged on an optical axis of the lens element.

2. (Amended) [A reflecting microoptical] An optical system as claimed in
claim 1,

wherein said first surface and said second surface are both aspherical.

3. (Amended) [A reflecting microoptical] An optical system as claimed in
claim 1,

wherein said first surface is aspherical.

Attachment to Amendment dated July 23, 2001

Marked-up Claims 1-4, 9-14, 21-24

4. (Amended) [A reflecting microoptical] An optical system as claimed in claim 1,

wherein said second surface is aspherical.

9. (Amended) [A reflecting microoptical] An optical system comprising, a lens element for focusing incident luminous flux at a predetermined position, said lens element having, from a long conjugate distance side, a first surface concave to the long conjugate distance side and a second surface strongly convex to a side opposite to the long conjugate distance side,

wherein the luminous flux passing through a peripheral part of said first surface is reflected at a peripheral part of said second surface, is again reflected at a central part of said first surface and [is imaged in the vicinity of a vertex of said second surface] imaged on an optical axis of the lens element.

10. (Amended) [A reflecting microoptical] An optical system as claimed in claim 9,

wherein said first surface and said second surface are both aspherical.

Attachment to Amendment dated July 23, 2001

Marked-up Claims 1-4, 9-14, 21-24

11. (Amended) [A reflecting microoptical] An optical system as claimed in claim 9,

wherein said first surface is aspherical.
12. (Amended) [A reflecting microoptical] An optical system as claimed in claim 9,

wherein said second surface is aspherical.
13. (Amended) [A reflecting microoptical] An optical system comprising a lens element having a first convex surface on the long conjugate distance side thereof with a reflective coating on a central portion thereof and a light admitting area on said convex surface at the periphery of said reflective coating, and a second convex surface on the opposite side thereof with a reflective coating on a peripheral portion thereof and a light transmissive region at the central portion thereof[, wherein at least one of said first and second surfaces is convex].
14. (Amended) The [reflecting microoptical] optical system of claim 13 wherein at least one of said first and second surfaces has an aspherical shape.

Attachment to Amendment dated July 23, 2001

Marked-up Claims 1-4, 9-14, 21-24

21. (Amended) The [reflecting microoptical] optical system of claim [20] 25 wherein at least one of said surfaces has an aspherical shape.
22. (Amended) The [reflecting microoptical] optical system of claim 21 wherein said first surface has an aspherical shape.
23. (Amended) The [reflecting microoptical] optical system of claim 21 wherein said second surface has an aspherical shape.
24. (Amended) The [reflecting microoptical] optical system of claim 13 wherein said lens element is made of molded glass.

7. A reflecting microoptical system comprising, from a long conjugate distance side, a first surface that is a plane surface and a second surface convex to a side opposite to the long conjugate distance side,
wherein luminous flux passing through a peripheral part of said first
5 surface is reflected at a peripheral part of said second surface, is again reflected at a central part of said first surface and is imaged in the vicinity of a vertex of said second surface.

8. A reflecting microoptical system as claimed in claim 7,
wherein said second surface is aspherical.

10 9. A reflecting microoptical system comprising, from a long conjugate distance side, a first surface concave to the long conjugate distance side and a second surface strongly convex to a side opposite to the long conjugate distance side,
wherein luminous flux passing through a peripheral part of said first
15 surface is reflected at a peripheral part of said second surface, is again reflected at a central part of said first surface and is imaged in the vicinity of a vertex of said second surface.

10. A reflecting microoptical system as claimed in claim 9,
wherein said first surface and said second surface are both aspherical.

20 11. A reflecting microoptical system as claimed in claim 9,
wherein said first surface is aspherical.

12. A reflecting microoptical system as claimed in claim 9,
wherein said second surface is aspherical.